

HOUSE OF COMMONS

Seventh Session—Twenty-first Parliament  
1952-53

SPECIAL COMMITTEE

on the  
Operations of the Government  
in the field of

ATOMIC ENERGY

Chairman: G. J. McILRAITH, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 5

[and  
reports]

WEDNESDAY, APRIL 8, 1953

WITNESSES:

Mr. Marc Boyer, Deputy Minister;  
Mr. A. Thunæs, Chief, Radioactivity Division, Mines Branch;  
Dr. W. A. Bell, Director of Geological Survey of Canada;  
all of the Department of Mines and Technical Surveys.





## MINUTES OF PROCEEDINGS

WEDNESDAY, April 8, 1953.

The Special Committee appointed to examine into the operations of the Government in the field of Atomic Energy met at 4.00 p.m. The Chairman, Mr. G. J. McIlraith, presided.

*Members present:* Messrs. Bourget, Brooks, Coldwell, Kirk (*Digby-Yarmouth*), McIlraith, Murray (*Oxford*), Pinard, and Winkler.—(8).

*In attendance:* Mr. Marc Boyer, Deputy Minister, Mr. A. Thunaes, Chief of Radioactivity Division, Mines Branch, and Dr. W. A. Bell, Director of Geological Survey of Canada, all of the Department of Mines and Technical Surveys.

Mr. Boyer was recalled and gave a broad description of the two distinct functions of the Mines Branch of the Department of Mines and Technical Surveys in the field of atomic energy.

Mr. Thunaes was called. He gave detailed evidence on the functions and activities of the Radioactivity Division of the Mines Branch of the Department of Mines and Technical Surveys in the field of atomic energy and was questioned thereon.

The Chairman tabled copies of the following documents which were to be presented and distributed to members of the Committee at its next meeting:

1. Recovery of uranium from Canadian ores.
2. The function of the mines branch radioactivity division.

Dr. W. A. Bell was called. He gave detailed evidence on the functions and activities of the Geological Survey of Canada of the Department of Mines and Technical Surveys in the field of atomic energy and was questioned thereon.

The witnesses were also questioned in relation to accommodation, salaries, recruitment, and training of professional personnel. (*See also pp. 85 et seq of evidence by Dr. Convey on Monday, March 30—No. 4*).

The witnesses retired.

The Chairman notified the Committee that Dr. A. H. Lang, Chief of the Radioactive Resources Division, Geological Survey of Canada, Department of Mines and Technical Surveys, would be the witness at the next meeting. He also announced that a film, "The Highway of the Atom", would be shown in the Railway Committee Room on Tuesday night, April 14.

At 5.30 p.m., the Committee adjourned until 4.00 p.m., Tuesday, April 14.

A. SMALL,  
*Clerk of the Committee.*





## EVIDENCE

APRIL 8, 1953.

4:15 p.m.

The CHAIRMAN: Gentlemen, can we come to order? At the last meeting of the Committee we heard evidence from Dr. John Convey, Director of the Mines Branch of the Department of Mines and Technical Surveys. Today I propose calling Mr. A. Thunaes, Chief of the Radioactivity Division of that department. Just before calling him, I would ask the Deputy Minister of Mines and Technical Surveys, Mr. Marc Boyer, to clarify the division of duties as between the different branches with which we are concerned in his department.

Mr. MARC BOYER (Deputy Minister of Mines and Technical Surveys): At our last appearance before you, I personally outlined the functions of the Department of Mines and Technical Surveys related to atomic energy. I have related them to two branches of our department, the Geological Survey of Canada and the Mines Branch. We had Doctor Convey explain after that the functions of the Mines Branch in relation to atomic energy. These are two different functions; one is all the assistance we give to the Chalk River project on its metallurgical problems; the other one is conducted by the Radioactivity Division, and that is the development and application of suitable processes for the recovery of uranium concentrates from the different ores of both the Eldorado Mining and Refining Company at Beaverlodge and Great Bear Lake and any private operator that comes into the picture as an independent operator. We have as chief of the Radioactivity Division of the Mines Branch Mr. Arvid Thunaes, and he will explain to you all the particulars of the work we are conducting there.

Doctor Convey at the last presentation gave a lengthy explanation of the metallurgical functions. He is a physicist and the ex-chief of the Physical Metallurgical Division and knows about all the problems of metallurgy at Chalk River. He left it to Mr. Thunaes to explain the functions of our Radioactivity Division dealing with uranium ores in Canada.

The CHAIRMAN: Mr. Thunaes, will you proceed.

**Mr. Arvid Thunaes, Chief, Radioactivity Division, Department of Mines and Technical Surveys, called:**

The WITNESS: Mr. Chairman, I will try to explain to you the functions of the Radioactivity Division. In 1945, when the demand for uranium became very great, there was only one operating mine in Canada, that at Great Bear Lake, and the particular ore at Great Bear Lake was treated by gravity methods. Now it very soon became apparent that such methods were wasteful and that, furthermore, they could not be used for the large majority of Canadian ores because most Canadian ores are low-grade and cannot be treated by the simple methods that were then known in 1945-46. The Mines Branch was asked to assist the Eldorado Company, which was formed in 1944, with its work at the uranium mines—were asked to assist in improving the recovery of uranium from that ore, and the group gathered together for that purpose was named the Eldorado project. Then, in 1948, uranium was thrown open for prospecting. Great interest was shown and a great many claims were



immediately staked. This staking has been going on at an increasing rate ever since. It became very apparent that most of these ores were not a source of uranium unless we could find new methods for treating them, and in the metallurgy of uranium we had no history in treating such ores, so the long process started of trying to develop these methods. We had to resort to chemical methods of extraction, leaching processes, and that has been the job of the Radioactivity Division; to develop such methods not only for Port Radium ores but for all the ores coming in from private prospectors. These ores vary a great deal and require individual treatment. Uranium occurs in a great many minerals and in a great many types of ore associated with different elements that may cause trouble in extraction. To emphasize the importance of research, I may say that the famous Beaverlodge field would not at all be an important source of production if we did not have chemical methods of treating these types of ores, because the amount of uranium that is recoverable by simple gravity processes would probably not exceed 10 per cent of the uranium in the ore.

The Radioactivity Division grew as the demand increased and at present it consists of four sections. These are, the sections for ore dressing and extractive metallurgy, the sections for chemical analysis, for mineralogy, and for radiometric analysis. The analysis of uranium is difficult in itself, and five or six years ago it was extremely difficult to even get an accurate estimation of the uranium in low-grade ores. Reliable methods had to be worked out slowly and they were worked out in co-operation with the laboratories in the United States and Great Britain so that we now have excellent methods for chemical analysis of uranium. The Radioactivity Division has contributed through the physics section to radiometric methods of analysis; that is, methods based on the geiger-counter principle and similar principles, and we now have several accurate methods for assaying ores by radiometric means as regards concentration of uranium ore. One rather unique process was developed at the Mines Branch, namely the LaPointe Picker Belt which utilizes the geiger tube and the radioactive properties of uranium to sort the ore on a conveyor belt. The efficient recovery of uranium can be accomplished only by chemical methods and these have been tested first of all on a beaker scale, and later by pilot-plant operations. For instance, the leaching process now being used at Port Radium for the treatment of tailings from the gravity mill was developed at the Mines Branch and by this process the ultimate loss of uranium from Port Radium is now very low indeed. Similarly, other processes have been developed for the treatment of carbonate types of ores and we can say we have processes available for treating most pitch-blende and uraninite ores. The aim is to make these processes more and more economical so that lower and lower grade ores can be treated, because the amount of uranium occurring as high-grade ore is quite limited. As we include ores of increasingly lower grade, the actual pounds of uranium available in Canada becomes very much greater providing we can extract it.

The Division has co-operated very closely with the Eldorado company and in the early years most of the research was concerned with Eldorado ores. In later years an increasing number of private companies have sent in samples for test work and each sample is a separate problem. In the last six months the rate has again increased, and it has come to a point where it will be rather difficult to maintain efficient service. We have certain ores in Canada which as yet cannot be very efficiently treated. There are the Columbite Tantalate types of ore, quite common in Ontario. Recovery of uranium from these ores require a great deal of research work, and we are now engaged in trying to find efficient methods for treating these ores; progress has been quite good but considerable research remains to be carried out.



Another function of the Division was to train operators for the new plant at Beaverlodge which is starting operations very soon. This training was done in a small pilot plant in the Mines Branch laboratories. As I mentioned before, the requirements for test work have increased tremendously and the space available is inadequate. We are hoping, due to the expansion of the work, that a new building will be available because we feel that, if more space is not available, we will soon get a backlog of samples on hand and that will have a very unfavourable reaction in the mining field. We hope through these expanded facilities to maintain efficient service.

The CHAIRMAN: That concludes Mr. Thunaes' general remarks. We are now open for questions.

*By Mr. Winkler:*

Q. As the methods of concentration—if that is the right word—improved, has it been found profitable to work over the old tailings at all as yet?—A. Yes. For instance, at Port Radium the tailings that formerly were dumped or stored are now being re-treated. They are being dredged from the lake, where they were buried, and re-treated.

*By Mr. Brooks:*

Q. What methods do they use in other places to treat ore? You said that experimental work was being carried out at Eldorado. What do they use in the Belgian Congo for instance?—A. In the Belgian Congo they had ores similar to the Port Radium ores, and they used gravity methods for concentration.

Q. It was a rich ore?—A. Yes.

Q. With this ore there must be a tremendous quantity of materials which are of no use. Do they eliminate as large a quantity of useless material as they can and then bring more or less the concentration of ore to some central place for testing for uranium? They would not bring great quantities of material out from Eldorado, for instance, or from Great Bear lake, or do they make tests there?—A. They make the actual concentrations at Great Bear lake, and the concentrates shipped out from Eldorado have been obtained either by gravity concentration or by leaching. So it is the precipitates or the gravity concentrates which are shipped out.

Q. They do not complete the tests at Great Bear lake?—A. The refining is being done at Port Hope.

Q. What percentage of the original material would be sent out from Great Bear lake to Port Hope?—A. I do not believe I am allowed to give the actual tonnage.

The CHAIRMAN: No, you are not.

The WITNESS: But I can say that the figure is well above 90 per cent.

*By Mr. Brooks:*

Q. You say more than 90 per cent of the material is sent out?—A. The uranium in the Port Radium ore is recovered in two plants, and the concentrates are shipped out. These concentrates would contain about 90 per cent of the uranium that was originally present in the ore.

Q. What I meant was, what quantity would be sent from Great Bear lake to Port Hope after they treated it?

The CHAIRMAN: Are there any more questions?

*By Mr. Brooks:*

Q. Are they training men at the universities to do this work, as well as at this special school you speak of?—A. Yes. At the University of British Columbia, at the University of Alberta, and at Queen's University there are



small groups working on these particular problems, specific problems in ore treatment. For instance, at Queen's University a group is doing research on the flotation of uranium ores. That is a rather important phase of the concentration of such uranium ores that are rather refractory as regards leaching. The uranium mineral must be concentrated before leaching, otherwise the process is too expensive.

Q. Are the students connected with the National Research Council before going to the universities, or are they just students who go to universities to take a course?—A. No. They are regular students.

Q. You say they are regular students?—A. Yes.

The CHAIRMAN: Are there any more questions?

*By Mr. Brooks:*

Q. In what other parts of Canada have they discovered low-grade ore? For instance, has any been discovered in the martimes?—A. We have had very few samples from the maritimes so far. Most of the ores have come from Saskatchewan, the Northwest Territories, Manitoba, and Ontario. Those are the main sources.

Q. But they are finding new locations all the time?—A. Yes.

*By the Chairman:*

Q. Mr. Thunaes, can you tell us what percentage of your work arises out of the ores supplied by other than the Eldorado Mining Corporation?—A. Yes. At the moment I would say from 50 to 60 per cent of our work is connected with ores coming from private companies. This particular percentage has been increasing quite rapidly. Some years ago most of our research was concerned with Eldorado ores, but such is not the case today.

Mr. BROOKS: What percentage of uranium are we using in Canada, and what percentage do we ship abroad? Is that a fair question?

The WITNESS: Well—

The CHAIRMAN: I think we are in difficulty there.

Mr. BROOKS: Well, I imagine perhaps we can skip it.

*By the Chairman:*

Q. How much of a staff have you on this work?—A. At present we have about 60 engaged on the regular staff of the Division.

Q. Yes?—A. But we generally have engineers from other companies, Eldorado or private companies, working on their particular ores.

Q. I mean: of your own staff, you would have about 60?—A. Yes.

Q. And you provide facilities for engineers from private companies who are working on their own ores?—A. That is right.

*By Mr. Brooks:*

Q. Do the men who go prospecting into the Beaverlodge or the Great Bear lake area proceed on their own? Does the department take any responsibility for them at all, or do they have to look after themselves altogether as far as food is concerned, for example?—A. That is outside my field, but I believe they are entirely on their own.

Q. It is a pretty risky business?

The CHAIRMAN: Is that all? There was one other question which was bothering me. Perhaps you could clear it up. I understand you to say that you were training operators for the new plant at Beaverlodge?—A. Yes.



Q. Why is it necessary to have your people train them?—A. We have the equipment for pilot plant operations. If we did not train them at the Mines Branch laboratory, Eldorado would have to build a separate pilot plant for that purpose, which would be rather a lengthy and costly process. But we have this equipment available.

Q. I take it that the pilot plant was your development? You developed it, did you not, in conjunction with Eldorado?—A. At Beaverlodge?

Q. Yes.—A. This carbonate-leaching process was originated at the Mines Branch. But in its present form it was developed to quite an extent at the University of British Columbia and by Eldorado. The Mines Branch has developed during the last year or two an alternative carbonate process, which is considerably simpler and less costly, and this process is now undergoing final pilot plant testing by Eldorado.

Q. Yes. Now then, do you have occasion to train operators for any private companies.—A. We have had requests from two companies lately for the pilot plant testing of ore, but I do not think we could say it is for training operators as yet.

Q. You are not at that stage as yet, or the private companies are not at that stage as yet?—A. Two of the private companies have requested pilot plant tests this summer, one starting in June and the other perhaps in August.

Q. Could you elaborate a little more fully on the extent to which a change is taking place in your work, comparing the work done for the Crown-owned company and the work done for the privately-owned companies?—A. Well, there are two reasons for that change. One is that the Eldorado Company ores have been tested sufficiently so that efficient processes are available. Therefore we do not need to carry on quite as much work for the Eldorado as previously. But the main reason is this: that there are more samples coming in from private companies than in previous years.

The CHAIRMAN: Are there any further questions?

*By Mr. Brooks:*

Q. How many private companies are operating in connection with this uranium?—A. Actually operating?

Q. Yes.—A. I could not give you the exact number. There are quite a number of companies who are now in mining development, in other words have started underground mining; but the only producers at the moment is the Eldorado company. It is expected that this condition will change in the next year or two and even this year there might be a couple of smaller companies shipping uranium concentrates, both from the Northwest Territories.

Mr. BROOKS: Has the government control of all companies engaged in handling uranium and does the government look on the uranium mining as sort of its special function?

The CHAIRMAN: No. They try to encourage private companies by undertaking to pay a minimum price for uranium ore for ten years.

Mr. BROOKS: But the government buys the uranium.

The CHAIRMAN: It undertakes to buy it all at a fixed minimum price for a fixed minimum time running out in 1962.

Mr. BROOKS: I was wondering what private companies were selling to the government that you know of?

The WITNESS: There are none yet, but they expect two small companies to ship this year and the private companies that are now developing in the Beaverlodge area are expected to produce within a few years.



Mr. BROOKS: These companies cannot do business with any other business concern organization except the government; they must sell to the government?

The WITNESS: Yes. As is the case with gold, the companies must sell to the government.

The CHAIRMAN: Any further questions of Mr. Thunaes?

Next week there will be two papers given by departmental officers at the Canadian Institute of Mining and Metallurgy with your permission, I would like to indicate them as having been tabled today and distribute them when they are delivered next week in Edmonton. They are somewhat technical papers but, if I could indicate them as having been tabled at this meeting, it would be convenient.

If there are no further questions for Mr. Thunaes, I will call on Dr. Bell. Dr. Bell is the Director of the Geological Survey of Canada.

**Dr. W. A. Bell, Director, Geological Survey of Canada, Branch of Department of Mines and Technical Surveys, called:**

I might explain that Dr. Bell is also going to be away next week and I would like to finish his evidence today. I expect it will be brief.

The WITNESS: Mr. Chairman and gentlemen: Direct participation by the Geological Survey in the federal activities in the atomic energy field began in 1944 when the Eldorado Crown Company took over the assets of the Eldorado Gold Mining Company. But, prior to that year, the Survey made very important although indirect contributions to the discovery of radioactive minerals. I would like to mention a few of the contributions that were the initial starters of the activities in most of the known important camps today where uranium is found. The first of these contributions consisted only of notices in several of our survey reports beginning in 1863 of the discovery of uranium mineral by an American on the north shore of Lake Superior. The exact locality of this discovery was not known, but the notices in the survey reports led a prospector in 1948, when he was equipped with a geiger counter, to rediscover this locality and that led also to the discovery of other occurrences in the Sault Ste. Marie district. The second occurrence which is important in this connection was made by an exploratory geological party in 1900 in the Northwest Territories. In their report they noted the occurrence of Cobalt on the east shore of Great Bear Lake. Now, thirty years later, this 1900 report led Gilbert La Bine to visit this locality in the hope of finding silver because silver was known in many instances to be associated with cobalt, particularly in the Cobalt camp of Ontario. He succeeded not only in finding silver but also pitchblende. This led directly, of course, to the Eldorado Mine. Following that discovery, the Geological Survey made several geological maps in that region and these proved to be very important when uranium took on the dominant interest in that field.

Between the years 1920 and 1932, the Geological Survey published several reports of very comprehensive investigations that were made of radioactive minerals associated with rare earth minerals in Ontario. These investigations were made by the late H. V. Ellsworth of the Survey staff who became, on account of this work, internationally famous as a pioneer in this geological work on radioactive minerals.

In recent years some of the survey parties have reinvestigated these deposits in Ontario and while, at the present time, their commercial importance is open to some question, as Dr. Thunaes pointed out, on account of the difficulty of concentration of material, it is not unlikely that some of them may be of commercial importance in the future. It is still being investigated by private capital.



We come now to 1934 when there was the discovery of gold in the Lake Athabaska region. This led the Survey to send a party to re-investigate and remap this district in the vicinity of what is now Goldfields, and in their report they recorded the occurrence of pitchblende in a gold-copper prospect at what was called the Nicholson. Ten years later, when the geologists of the Crown company and Geological Survey jointly made investigation of all known radioactive occurrences, it led to a re-investigation of the Nicholson occurrence and the survey of the surrounding district. As a result of the recommendation of the geologists, the Crown company took up many claims in that district and, of course, this was the beginning of the present activities in the Lake Athabaska area. In 1944, when the Crown company was formed, it immediately asked the Geological Survey to assist in searching for new ore by making special investigations of the known occurrences at Great Bear Lake and by extending the Geological Survey maps in that district and through other favourable districts. Among these latter districts was the Lake Athabaska one which has been referred to already. Prospectors were attached to some of these parties and as a result very many occurrences of uranium were found, particularly in the Lake Athabaska district.

All together, since 1944, the Survey has made 19 geological maps of the most important uranium districts. Their scales vary from very detailed maps, one inch to 400 feet up to one inch to one mile.

That briefly outlines the general activity of the Geological Survey in regard to atomic energy, but in 1947 when the mining of uranium by private individuals and companies was again permitted by the government, the Geological Survey realized that the demands upon it for information and for field work would be greatly increased, and to meet this demand they formed a special division within the Survey known as the Radioactive Resources Division. One of the primary functions of this division is to act as an official agent for the Atomic Energy Control Board in matters dealing with the prospecting and mining of uranium. Doctor Lang, who is the present chief of the division, will be able to explain more fully the work of the division.

In closing, I would like to mention that one of the greatest difficulties that we have in carrying on our work, both in this division and in other divisions of the Survey, is the difficulty of security-qualified geologists and keeping them on our staff. Within the past 15 months we have lost 14 fully qualified geologists, which is 20 per cent of our total staff of that grade, and they have resigned from the Survey to accept positions which, on an average, pay 60 per cent more salary. This, of course, affects not only the Radioactivity Division but it affects the other types of mapping which are indirectly almost as important as the mapping in the known areas, because most of our parties now in any areas that are at all favourable for uranium occurrences are equipped with geiger counters and are sent out to look for areas that might be suitable ground for uranium. I think that is all, Mr. Chairman.

The CHAIRMAN: Could you explain just a little more clearly just what Doctor Lang's part in the organization is? I do not quite understand how the Radioactive Resources Division fits into the Geological Survey.

The WITNESS: As far as the field work is concerned, it is tied in intimately with our general field parties. Our main division for field work is called Regional Geology Division. Its function is to prepare geological maps, utilizing base maps furnished by the Surveys and Mapping Branch of the Department, but the Radioactive Resources Division was set up to carry out duties arising from the circumstance that we were designated the official agent of the Atomic Energy Control Board for filing and keeping of information of all radioactive occurrences and developments. It was a regulation of the Board that required prospectors and others to record all occurrences and all analyses or assays that were made of uranium. So, the main function of that division is to maintain a confidential inventory of all occurrences, and it also examines in the field as



many deposits as possible in order to advise prospectors and to gather data that will be useful in searching for other deposits. So we have in the division a very limited number of geologists. We should have more. In addition we have one or two mineralogists who make special studies of deposits. For instance, currently we are studying in very great detail scale the ores at Beaverlodge.

The CHAIRMAN: You said in your evidence a few moments ago that the commercial importance of the deposits in Ontario was open to some question. I take it that that is all linked up with the proved methods of recovery?

The WITNESS: That is linked up entirely with the recovery. There is one hopeful advantage of such deposits, and that is that associated rare earths may be of importance, such as beryllium, cerium, columbium, and tantalum. The chief difficulty, I understand, as to the uranium is to get a concentrate that will carry 10 per cent of uranium, that is to provide the Crown company with the required concentration.

*By Mr. Winkler:*

Q. Are there a large number of mapping parties engaged every summer?—

A. As I say, we would like to have more. We have on an average of about four geologists in uranium country. The provinces, of course, are doing a great deal of detailed work; Saskatchewan, particularly, Manitoba to some extent. We coordinate our programs with theirs.

Q. And in the Northwest Territories?—A. In the Northwest Territories we are responsible entirely. One of the reasons why we had a helicopter operation last year was to speed up the reconnaissance mapping of an area that looks really favourable for uranium occurrences. We shall provide reconnaissance maps on the scale of eight miles to the inch, which will be of great help to the prospector in drawing attention to those areas worth while looking into with more detail on the ground. It came out that from ten to almost forty per cent of that area looks rather promising for mineral deposits, which is a high percentage in a pre-Cambrian country. We covered last year 57,000 square miles by using five geologists; ordinarily a party of five would take about 25 years to cover the area by ordinary ground methods.

*By the Chairman:*

Q. How did you achieve that?—A. They achieved that by examining by helicopter hovering close to the ground, making about 15 landings per day and testing the rocks.

Q. You used airborne reconnaissance instruments as well?—A. Well, that is one thing that we are still working on. There is considerable need, and it would be a great help if we had an airborne instrument that could be used in a plane for detecting radioactivity. A great deal of work was done on that a few years ago by the Crown company and we cooperated in that work with our geophysicist. While they have an instrument, a scintillometer, it was not too successful for reconnaissance from the air in pre-Cambrian country. They found they had to do so much ground work to check anomalies that showed radioactivity, so the idea now is to try to improve that instrument so we can suspend it from a plane on a cable, and have another instrument on the plane so that you have two recordings. In finding the differential between them, we figure we may do away with some of the general background anomalies which seemed to confuse the picture previously. We are coordinating with the Crown Company in developing such an instrument by making tests from a plane this summer. We have to decide the length of the cable safe to use, and the instrument itself will be suspended in a cage, called a "bird", at the end of the cable. If it works successfully, we are going to instal it in the plane which will be used this summer in aerial magnetic surveys. We hope to give it a fair test this summer and judge of its value as a reconnaissance instrument.



*By Mr. Brooks:*

Q. Is it a difficult matter to store uranium concentrates for future use with all this radioactivity?—A. That question is really for the Mines Branch.

The CHAIRMAN: Could you come over here, Mr. Thunaes? Mr. Thunaes can answer that.

Mr. BROOKS: It may be a silly question.

The CHAIRMAN: No, we can have an answer to that.

Mr. THUNAES: There is no danger if ordinary precautions are taken. We have to be careful but, as far as actual radiation is concerned, there is no danger.

Mr. BROOKS: You have to make special provisions for storing it. You cannot store it like gold at Fort Knox or iron or these other minerals. I would think you would have to take some special precautions for the storing of uranium.

Mr. THUNAES: It is not kept in very large quantities in this country.

Mr. BROOKS: We are speaking of increasing production and I am wondering what facilities you have to store it.

Dr. LANG: I do not think there is any danger of theft.

Mr. BROOKS: I am not talking about theft, but radiation.

Dr. LANG: If there was any danger we would lower the content of the stock, but that would be over a period of years and it is quite common for the mines to store it.

The WITNESS: They do not encourage people to carry samples around in their pockets.

Mr. BROOKS: That is what I understood.

Dr. LANG: Ores are not concentrated to that extent.

The WITNESS: No, these are pure pitchblende samples.

The CHAIRMAN: Any further questions for Dr. Bell?

*By Mr. Kirk:*

Q. Did I understand Dr. Bell to say that this new apparatus, the bird cage, would be used this summer?—A. Yes. We are hoping to have a test with a plane before we go out to the field on aeromagnetic surveys. We will have a couple of weeks test to see how it will work. They may run over the Soo area where we know there are deposits or they may have tests with planted uranium.

Q. You will make the test and then go into Nova Scotia and Newfoundland?—A. Yes.

Q. This apparatus I believe hangs from the plane?—A. Yes. The Crown Company is trying to develop a radioactive detector which can be suspended in a bird suspended from the plane. We will have a magnetometer in the same plane. We are going to experiment with the length of cable that can be used. Too long a cable may be too big a drag on the plane. We are going to use a cable of some length for suspension of a second magnetic detector and if we can get a suitable reconnaissance radioactive detector from the Eldorado Company there will be no difficulty in combining a radioactivity survey with a magnetic one.

Q. You mean two surveys at once?—A. Yes. You can do two surveys at once. It would show up certain anomalies that might warrant direct ground surveys of a more detailed and more thorough nature.

Q. Is this part of a general plan to survey all across Canada?—A. In general, we have a regional plan in aero-magnetic work, but private people are doing this work too, and our programs are of a more regional nature and



are designed to fit in with our long range geological mapping programs. The aeromagnetic maps will aid in an interpretation of the geology of an area.

Q. In other words, this is part of a general plan, but at the present moment there is no specific reason for going to one area rather than another except to fit in with the general plan?—A. No, except that the general area chosen is considered probably more favourable for metallic deposits.

The CHAIRMAN: Any further questions?

Mr. BOURGET: I would like to ask Mr. Boyer if the department is contemplating getting better accommodation for the Radioactivity Division, because, if I understand correctly, Mr. Thunaes said they were carrying on their work in two small huts and if they cannot get better accommodation the work will fall behind.

Mr. BOYER: We have a preliminary sketch of the building that will be added as an annex to another building of the Mines Branch on Booth Street, to take care of all the expanse there of the work, and the new work that will be coming in from private companies. The project is presently at a preliminary stage, but we are trying to get the government to allow a certain amount of money for the design, and possibly start on the construction of that building as soon as possible.

The CHAIRMAN: You are pretty badly overcrowded in these huts?

Mr. THUNAES: Yes.

The CHAIRMAN: That is my impression. Your work is being interfered with right now through lack of space?

Mr. THUNAES: Yes, because through lack of space we have not got space to put more men in there to catch up with the work.

The CHAIRMAN: Are there any further questions?

*By Mr. Kirk:*

Q. There was one statement you made a little while ago about the resignation of 14 geologists in a period of 15 months, and that it was 20 per cent of the staff of trained geologists?—A. Those were all Ph.D's.

Q. Roughly 14 out of 69?—A. We have had more resignations outside of that class, but that was the hardest hit one, the professional class, because it takes years of training and experience.

Q. These men have had training at university?—A. They got their training with us. They had at least 5 years of training in field work with us.

Q. What about your replacements, aside from the loss of the five years of training? Are you getting replacements?—A. We are not able to get replacements because we are having the same difficulty in getting younger men from among the graduates. We need this year, or we should have about 72 senior geological assistants, men who are graduates of a university and who have had at least one year's experience in the field. But we have only had applications from 50, and of them only about 30 have had that one year's experience, so they cannot be classified as suitable senior assistants as yet. It is from the senior assistants that we get the senior recruits to take their Ph.D. degrees and continue work on the staff. It seems as if this crisis will go on for years.

Q. These men who are leaving are getting 60 per cent more than they would have got in the federal civil service?—A. It varies from 30 to 85 per cent.



*By Mr. Brooks:*

Q. Where are they going?—A. Some are going into the same line of work. Some are going to metal mining companies. Oil companies are one of the big competitors now; but it is just about fifty fifty between them and mining companies.

Q. But they are in that general picture. It is not such a loss at all, so far as the work is concerned in the country, if they are going to private concerns and to universities?—A. Well, of the 14, 2 are going to India; 1 is going to East Africa, with a mining company; and 2 are already in Trinidad with an oil company.

Q. I think Dr. Mackenzie told us the other day that they used to lose a lot of good men, but since they lost to industry in Canada it was not really such a great loss after all, as far as the development of the work is concerned.

Mr. BOURGET: With respect to those who are going to India, are they going under a technical assistance plan, or are they going under the auspices of private concerns?

The WITNESS: I did not include them in the 14. These are men who resigned.

*By Mr. Kirk:*

Q. With the increase in the work of your department and in prospecting, and in what the various companies are doing, you are going to be put into a position where you cannot carry on in the way you have been, let alone look after an increase?—A. That is it, precisely. Outside of the 14 who left, I have a list of about 20 on our staff who have received offers for the most part involving the same amount of salary increase. It is just nip-and-tuck whether those men will go or remain. But they are men who like to do research, and they are not anxious to go.

Among the older men there would be a lot more offers from industry in Canada, except that the mining industry does not wish to weaken the Survey. We provide the basis information. That is one reason why we do not lose more to industry. In the first instance they may be able to get our men, but at the same time they are at a loss in gathering that general basic information which is important for the discovery of new deposits, or even for their development.

*By the Chairman:*

Q. Your problem is the problem arising from these men leaving because they can get more adequate compensation for their services?—A. Yes.

Q. But there is also another problem. We are not developing enough graduates in that line of work?—A. That is true, but I think that if we could have met the competition in salary, not the full way, but let us say half way, I do not think we would have lost any of those men.

Q. But would not private industry then be short of men? Where would they get their supply of men?—A. That is possible.

Q. So, to come back to it, there is a shortage in the number who are going through?—A. Yes.

Q. Do you have any system of scholarships or fellowships similar to that which the National Research Council has in its work?—A. No.

Q. You have nothing of that sort?—A. We have nothing of that sort, because the National Research Council scholarships and bursaryships include geology as well as the other sciences. The Survey does not give research grants to universities on a research project basis. They are granted according to recommendations of a National Advisory Committee for Research in the Geological Survey that was set up several years ago.



Q. Yes?—A. This Committee was formed as a result of recommendations by the C.I.M.M.

Q. What is that?—A. That is the Canadian Institute of Mining and Metallurgy. They asked the government for such a Committee because they felt there should be more geological research done. The Committee has been instrumental in getting the research grants established. It has encouraged a certain amount of research work in the universities, because they give grants somewhat similar to the National Research Council grants in other fields of science. The grants are for projects only. They may help students already doing graduate work at university, but we have no scholarships for undergraduates.

Q. That grant is made to a university?—A. The grant is made to a university for a specific type of research.

Q. Is that under the direction of your department?—A. It is included in the Survey estimates.

Q. How many of those grants have you made in fact this year?—A. Roughly, around 15.

Q. Around 15?—A. Around 15, and they are distributed as follows: McGill, Laval, Toronto University, Queen's, McMaster, Manitoba, and British Columbia. I think that includes most of them. Any university can make application each year.

Q. How much are those grants?—A. They vary. It is based on a project basis. The total sum that we had out last year was about \$18,000, I think. We had applications for about \$23,000. So \$25,000 in the estimates for this year are included for grants, which sum, I think, with the available personnel now, would be about standard for a few years. We can probably give out \$25,000 for different projects in the universities.

Mr. BOURGET: Would you employ students during the summer holidays?

The WITNESS: Oh, yes. We would like to employ students. We would like to get about 115 undergraduates, and between 70 to 80 graduates, but it is difficult.

*By Mr. Kirk:*

Q. It seems to me that is a rather sad commentary on the present state of affairs. What are you paying your junior geologists? What is the range? And what are you paying your senior men who have their Ph.D. degrees and the years of experience when they come to you?—A. The student, first coming in—not the graduate—will receive about \$140 per month.

Q. That is the undergraduate?—A. The undergraduate would receive from \$140 to \$200; and the graduate would start off with about \$220 and go to about \$340 per month, that is only for seasonal work; and I am afraid that I cannot give you the exact figures just now. Would you know that, Dr. Lang? It varies on a scale according to their experience. They are graded by the Civil Service Commission entirely.

The CHAIRMAN: Could we have the salary classification put in the evidence?

Mr. KIRK: I think it would be a very good idea.

The CHAIRMAN: For junior geologists and for senior geologists.

Mr. KIRK: I mean the full-time men you have lost, not the summer jobs. I mean the men who come in for full time. I am interested in their salaries and those who had their post-graduate degrees, such as the Ph.D.



SALARY RANGES BY CLASSIFICATIONS

Geologist, Grade 1—\$3,120, \$3,300, \$3,540, \$3,780, \$4,020, \$4,220; Grade 2\*—\$4,300, \$4,500, \$4,700, \$4,880, \$5,080, \$5,260; Grade 3—\$5,260, \$5,460, \$5,640, \$5,920; Grade 4—\$5,980, \$6,220, \$6,460, \$6,580;

Senior Geologist: \$6,600, \$6,900, \$7,200.

The WITNESS: I can only give you offhand that we start at \$4,300 with Ph.D's. Industries take these same men out at an average salary of \$7,500 to start. We start at \$4,300 and go up to a fully qualified senior geologist at \$6,800.

Dr. LANG: \$7,200.

*By Mr. Bourget:*

Q. Do you think your loss is due to a question of salary?—A. I think it is at the present time. The younger man we have been getting has had to struggle. It is quite a financial burden to go through three years post-graduate work to get your doctor's degree. So a good many of them are almost in debt when they come in the Survey. Then they come to the housing situation in Ottawa and a lot of them have had to buy homes with a mortgage and most of these men told me that for financial reasons they just simply could not stay.

Q. They did not tell you how much they would be getting?—A. Yes. We supplied the civil service just recently with a list of these 14. We could not in all cases, but in the majority of the fourteen we did.

Q. Did private industry offer a lot more than the department?—A. The average is 60 per cent more on the initial salary. If a man makes good in industry his chances of promotion are more rapid than in the government.

Mr. PINARD: How long does it take a man to obtain the top salary of \$7,200?

The WITNESS: It depends on the promotion and promotion depends a great deal on the wastage through superannuation and so on, but generally it takes fifteen years, ordinarily, before he would go from geologist grade two up to senior geologist which is the highest he can reach.

Mr. MURRAY: Do your geologists share in any stake if they make a strike?

The WITNESS: No.

Mr. MURRAY: Does private enterprise?

The WITNESS: I could not say offhand. Some companies do, particularly if they go out with smaller companies they may get a share. I could not say. But we cannot even speculate in mining properties of any kind. That is against our oath of office really. We are not to get any outside remuneration, which is only fair, because we must write unbiassed reports.

Mr. PINARD: Is your problem more acute than in other departments of the civil service?

The WITNESS: I think at the present time in geology there is more competition. Exploration started it off and there has been a tremendous exploration since the war.

Mr. BOYER: The problem has been put before you by Dr. Convey and Dr. Bell, but the more acute is that of the Geological Survey and it is getting to a situation of panic there. It is presently before the Civil Service Commission for discussion.

Mr. BOURGET: The secretary of the engineering corporation at Quebec knows there is an acute problem in trying to get professional engineers, so it

\*The initial salary for a Geologist who has obtained his Ph.D. is \$4,300 per annum.



goes for geologists and other scientists. But I do think the question of salary is one that will have to be looked into because they are not paid the salary they deserve.

The WITNESS: There it too big a discrepancy. The government service has a distinct attraction to a lot of men who are interested in science and research work because they can publish their results and are given a pretty clear opportunity or right to do research work. I think in industry they are much more handicapped; there is more routine work. Some of the companies permit them to publish scientific papers, but they do miss a great deal if they are interested in science. Some of them, of course, want to go out and make money.

The CHAIRMAN: This problem, I think, narrows down to the amount of salary. There are certain benefits working in your branch that are better than in private industry to anyone really interested in research, and then your superannuation provisions are good and things of that nature.

Mr. BOYER: I think I can add that the Geological Survey of Canada has existed for 110 years and there is tradition and there is pride in belonging to the Survey for all geologists there. If they leave in those numbers, it is a question of salary.

The CHAIRMAN: Any further questions? Thank you Dr. Bell.

Now, on Tuesday night, in the regular film showing for members, the film "The Highway of the Atom" will be among those shown. It is a thirty-five minute film of the Northern Transportation Company's activities. It is of no particular informative value in relation to the work of the Committee, but should be of considerable interest.

We have one more witness from the Department of Mines and Technical Surveys, he is Dr. Lang of the Radioactive Resources Division of the Geological Survey of Canada. We also have the slides of the Eldorado Company showing their activities. I understand the slides of the Eldorado Company are quite interesting and quite informative to anyone seeking to understand the operations of that company. We also have slides from the Geological Survey of Canada and it occurred to me that we might hear Doctor Lang and then see the slides from the department and the slides from Eldorado all at the one meeting. Does that arrangement meet with your wishes?

Agreed.

What about the time of the next meeting? Tomorrow morning is impossible; we cannot have the Eldorado slides available tomorrow. What about next Tuesday?

Agreed.





